

AMENDMENTS TO THE CLAIMS

Please amend claims 1, 10, 21, 22, and 29; and add claims 32-36 as follows.

1. (Currently amended): A method for fabricating a BST parallel plate capacitor comprising:
forming a bottom electrode supported by a substrate, including forming a lateral shape of the bottom electrode;
forming a BST thin film dielectric region over the bottom electrode, including producing BST material over the bottom electrode only after the lateral shape of the bottom electrode is formed; ~~and~~
forming a top electrode over the BST thin film dielectric region, including producing top electrode material over the BST thin film dielectric region; and
after producing the top electrode material, annealing the BST material to repair damage to the BST material without first producing an annealing layer in contact with the BST material.
2. (Original): The method of claim 1 wherein the step of forming a bottom electrode supported by a substrate comprises:
forming a lift off mask over the substrate, the lift off mask defining the lateral shape of the bottom electrode;
depositing a layer of bottom electrode material over the lift off mask; and
removing the lift off mask, thereby forming the lateral shape of the bottom electrode.
3. (Original): The method of claim 2 wherein:
the step of forming a lift off mask over the substrate comprises depositing a photoresist lift off mask over the substrate; and

the step of depositing a layer of bottom electrode material over the lift off mask
comprises depositing a platinum layer over the photoresist lift off mask.

4. (Original): The method of claim 1 wherein the step of forming a bottom electrode supported by a substrate comprises:

forming a layer of bottom electrode material over the substrate; and
removing selected lateral portions of the bottom electrode material, thereby forming the
lateral shape of the bottom electrode.

5. (Original): The method of claim 4 wherein:

the step of forming a layer of bottom electrode material over the substrate comprises
depositing a platinum layer over the substrate; and
the step of removing selected lateral portions of the bottom electrode material comprises
etching away selected lateral portions of the platinum layer.

6. (Original): The method of claim 1 wherein the bottom electrode is a platinum bottom electrode.

7. (Original): The method of claim 6 further comprising:

forming a titanium adhesion layer located between the substrate and the platinum bottom electrode.

8. (Original): The method of claim 1 wherein the bottom electrode consists essentially of a noble metal.

9. (Original): The method of claim 1 wherein the bottom electrode consists essentially of a conductive oxide.

10. (Currently amended): A method for fabricating a BST parallel plate capacitor comprising:
forming a bottom electrode supported by a substrate;

forming a BST thin film dielectric region over the bottom electrode, including producing BST thin film material over the bottom electrode; ~~and~~
forming a top electrode over the BST thin film dielectric region, including producing top electrode material over the BST thin film material immediately after producing the BST thin film material but before annealing the BST thin film material, wherein a lateral shape of the BST thin film dielectric region is formed only after producing the top electrode material over the BST thin film material; and after producing the top electrode material, annealing the BST thin film material to repair damage to the BST thin film material without first producing an annealing layer in contact with the BST thin film material.

11. (Withdrawn): The method of claim 10 wherein the step of forming a top electrode over the BST thin film dielectric region comprises, immediately after producing the BST thin film material and before forming a lateral shape of the BST thin film dielectric region:

forming a lift off mask over the BST thin film material;
depositing a layer of top electrode material over the lift off mask; and
removing the lift off mask, thereby forming the lateral shape of the top electrode.

12. (Withdrawn): The method of claim 11 wherein:

the step of forming a lift off mask over the BST thin film material comprises depositing a photoresist lift off mask over the BST thin film material; and
the step of depositing a layer of top electrode material over the lift off mask comprises depositing a platinum layer over the photoresist lift off mask.

13. (Original): The method of claim 10 wherein the step of forming a top electrode over the BST thin film dielectric region comprises, immediately after producing the BST thin film material and before forming a lateral shape of the BST thin film dielectric region:

forming a layer of top electrode material over the BST thin film material; and

removing selected lateral portions of the top electrode material, thereby forming the lateral shape of the top electrode.

14. (Original): The method of claim 13 wherein:

the step of forming a layer of top electrode material over the BST thin film material comprises depositing a platinum layer over the BST thin film material; and the step of removing selected lateral portions of the top electrode material comprises etching away selected lateral portions of the platinum layer.

15. (Original): The method of claim 13 wherein the step of forming a layer of top electrode material over the BST thin film material comprises:

depositing a platinum layer over the BST thin film material, wherein deposition of the platinum layer occurs in a same processing chamber as production of the BST thin film material, and without interim removal of the BST parallel plate capacitor from the processing chamber.

16. (Original): The method of claim 10 wherein the top electrode is a platinum top electrode.

17. (Original): The method of claim 10 further comprising:

forming a passivation structure over the BST thin film dielectric region, including producing passivation material over the BST material only after the top electrode material is produced over the BST material.

18. (Original): The method of claim 17 wherein the passivation structure consists essentially of Al_2O_3 or SiO_2 .

19. (Original): The method of claim 17 wherein the passivation structure consists essentially of a silicon nitride.

20. (Original): The method of claim 17 wherein producing passivation material over the BST material occurs immediately after the top electrode is formed.

21. (Currently amended): The method of claim 10 further comprising: ~~A method for fabricating a BST parallel plate capacitor comprising:~~

~~forming a bottom electrode supported by a substrate;~~

~~forming a BST thin film dielectric region over the bottom electrode, including producing BST thin film material over the bottom electrode;~~

~~forming a top electrode over the BST thin film dielectric region, including producing top electrode material over the BST thin film material immediately after producing the BST thin film material but before annealing the BST thin film material, wherein a lateral shape of the BST thin film dielectric region is formed only after producing the top electrode material over the BST thin film material; and~~

~~annealing the BST thin film dielectric region only after the top electrode material is produced over the BST material.~~

22. (Currently amended): A method for fabricating a BST parallel plate capacitor comprising:

forming a platinum bottom electrode supported by a substrate, including forming a lateral shape of the platinum bottom electrode;

forming a BST thin film dielectric region over the platinum bottom electrode, including producing BST material over the platinum bottom electrode only after the lateral shape of the platinum bottom electrode is formed; ~~and~~

forming a top electrode over the BST thin film dielectric region, including producing top electrode material over the BST material ~~before annealing the BST material~~ and either immediately after the BST material is produced or immediately after the lateral shape of the BST thin film dielectric region is formed; and

after producing the top electrode material, annealing the BST material to repair damage to the BST material without first producing an annealing layer in contact with the BST material.

23. (Original): The method of claim 22 wherein:
the top electrode material is produced over the BST material immediately after the BST material is produced; and
a lateral shape of the top electrode is formed before a lateral shape of the BST thin film dielectric region is formed.
24. (Original): The method of claim 22 wherein the step of forming a platinum bottom electrode comprises using a lift off process to form the platinum bottom electrode.
25. (Withdrawn): The method of claim 22 wherein the step of forming a top electrode over the BST thin film dielectric region comprises using a lift off process to form a platinum top electrode.
26. (Original): The method of claim 22 wherein the step of forming a top electrode over the BST thin film dielectric region comprises using deposit and etch processes to form a platinum top electrode.
27. (Original): The method of claim 22 wherein the top electrode is a gold top electrode.
28. (Original) The method of claim 22 further comprising:
forming a passivation structure over the BST thin film dielectric region, including
producing passivation material over the BST material only after the top electrode material is produced over the BST material.
29. (Currently amended): A method for fabricating a BST parallel plate capacitor ~~The method of claim 22 further~~ comprising:

forming a platinum bottom electrode supported by a substrate, including forming a lateral shape of the platinum bottom electrode;
forming a BST thin film dielectric region over the platinum bottom electrode, including producing BST material over the platinum bottom electrode only after the lateral shape of the platinum bottom electrode is formed;
forming a top electrode over the BST thin film dielectric region, including producing top electrode material over the BST material and either immediately after the BST material is produced or immediately after the lateral shape of the BST thin film dielectric region is formed; and
annealing the BST thin film dielectric region only after forming ~~the~~ a passivation structure.

30. (Withdrawn): The method of claim 22 wherein:

the step of forming a platinum bottom electrode comprises using a lift off process to form the platinum bottom electrode;
the top electrode material comprises platinum, and the top electrode is formed using a lift off process immediately after the BST material is produced and before a lateral shape of the BST thin film dielectric region is formed;

wherein the method further comprises:

forming a passivation structure over the BST thin film dielectric region, including producing passivation material over the BST material only after the top electrode material is produced over the BST material; and
annealing the BST thin film dielectric region only after forming the passivation structure.

31. (Previously presented): The method of claim 10 wherein the step of forming a bottom electrode supported by a substrate includes forming a lateral shape of the bottom electrode.

32. (New): The method of claim 29 wherein the step of forming a platinum bottom electrode supported by a substrate comprises:

forming a lift off mask over the substrate, the lift off mask defining the lateral shape of the bottom electrode;
depositing a layer of bottom electrode material over the lift off mask; and
removing the lift off mask, thereby forming the lateral shape of the bottom electrode.

33. (New): The method of claim 32 wherein:

the step of forming a lift off mask over the substrate comprises depositing a photoresist lift off mask over the substrate; and
the step of depositing a layer of bottom electrode material over the lift off mask comprises depositing a platinum layer over the photoresist lift off mask.

34. (New): The method of claim 29 wherein the step of forming a platinum bottom electrode supported by a substrate comprises:

forming a layer of bottom electrode material over the substrate; and
removing selected lateral portions of the bottom electrode material, thereby forming the lateral shape of the bottom electrode.

35. (New): The method of claim 34 wherein:

the step of forming a layer of bottom electrode material over the substrate comprises depositing a platinum layer over the substrate; and
the step of removing selected lateral portions of the bottom electrode material comprises etching away selected lateral portions of the platinum layer.

36. (New): The method of claim 29 further comprising:

forming a titanium adhesion layer located between the substrate and the platinum bottom electrode.